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MANUAL TOOTHBRUSH

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TECHNICAL FIELD

This application relates to a manual toothbrush. The invention pertains to a manual toothbrush according to the preamble of Claim 1.

BACKGROUND

A manual toothbrush of this type is already known from Patent No. FR-2600512 A1[[.]] discloses a manual toothbrush including a toothbrush head and a toothbrush head carrier. The carrier of the toothbrush head is essentially realized in a The carrier is arranged in a U-shaped fashion such that the lateral, obliquely raised edge regions of the surface on the brushing side lie opposite of one another. In this case, the bristle clusters arranged on the brushing side of the U-shaped carrier only converge to such a degree that their free ends form a receptacle space, into which individual teeth as well as part of the gums gums can penetrate during the brushing process. During brushing, The the bristle clusters simultaneously clean the inside insides and the outsideoutsides surfaces of both the teeth and of the marginal gums are treated and cleaned by the bristle clusters in this fashion during the brushing process.

A pivot bearing connects the The toothbrush head is connected in a pivoted fashion to the handle and allows the toothbrush head to pivot about the handle by means of a pivot bearing. Due to this measure Because the toothbrush head is free to pivot about the handle, the U-shaped carrier of the toothbrush head also continuously encompasses the teeth during the brushing. Thus, the opposing bristles are always directed essentially perpendicular to the inner and outer surfaces of the teeth and gums. process if its

~~direction changes, namely without having to readjust the handle in accordance with the alignment of the teeth. This simplifies the handling of the toothbrush and leads to superior brushing results in the region of the incisors as well as in the region of the molars.~~

~~This means that the toothbrush head is continuously oriented in accordance with the alignment of the teeth similar to a wheel guided on rails and pivoted relative to the handle in accordance with the direction of the teeth. This ensures that the opposing bristles are always directed essentially perpendicular to the inner and outer surfaces of the teeth and the gums. Nevertheless, the prior art design requires One less advantageous aspect of this manual toothbrush can be seen in that the toothbrush head needs to be aligned with a row of teeth for each newly beginning brushing process such that it can be easily placed over the teeth and is not oriented transverse thereto.~~

~~The invention is based on the objective of developing a manual toothbrush that can be handled more easily and always assumes a defined home position during the alignment of the toothbrush head relative to the handle.~~

#### SUMMARY

~~According to~~ In one aspect of the invention, a manual toothbrush includes this objective is attained with the characteristics disclosed in the characterizing portion of Claim 1. The a handle, a toothbrush head mounted on the handle, bristle clusters extending along a surface on the brushing side of the toothbrush head to form a receptacle space for teeth, a pivot bearing arranged between the toothbrush head and the handle for pivoting

the toothbrush head relative to the handle during the brushing process, and a spring element arranged between the toothbrush head and the handle to move the toothbrush head back to its unpivoted position after the brushing process. The spring element ~~that~~ engages on the toothbrush head and is supported in the handle with the other end, ~~makes it possible to ensure~~ ensuring that the toothbrush head always assumes a predefined position relative to the handle in the unpivoted ~~home~~ position of the manual toothbrush.

For example, if the receptacle space formed between the edge regions of the bristle clusters extends in the longitudinal direction of the handle, a user ~~merely needs to guide~~ guides the toothbrush head to the teeth in the direction in which the teeth extend. ~~In this case, the~~ The direction of the handle also assumes the direction of the teeth, i.e., when brushing the molars that are directed toward the rear of the oral cavity, the handle is also held in this direction such that the receptacle space ~~has also assumed~~ assumes this position and therefore can be easily placed over the teeth without requiring complicated manipulations.

~~The invention also improves the brushing of the teeth in that, if~~ If the handle is slightly pivoted relative to the toothbrush head, the pressure exerted upon the tooth flanks on the inside and the outside of the teeth can be respectively increased or decreased under the control of the spring [[.]], thereby improving the brushing of the teeth.

The cleaning of the toothbrush head is also simplified because it can ~~only~~ yield to ~~the~~ hand movements during the cleaning process by simultaneously building up a spring force, but ~~not~~ the toothbrush head does not

~~rotate, as it is the case with the state of the art, in which no spring is provided.~~

In some embodiments, the pivoting axis of the bearing extends transverse or angled to the longitudinal axis of the handle. ~~The characteristics of Claim 2 make it possible to~~ This can help to realize the customary brushing position for most manual toothbrushes such that the handling is simplified. If the pivot bearing is arranged underneath the bristles, i.e., ~~about centrally referred~~ approximately centered relative to the toothbrush head, the teeth are uniformly brushed on both edges if the bristle clusters are symmetrically arranged in the edge regions. However, the pivot bearing may also engage on the toothbrush head eccentrically.

~~In a preferred~~ certain ~~embodiments,~~ the pivot bearing limits the pivoting range of the toothbrush head relative to the longitudinal axis to less than 30° (e.g., to 20°). ~~The characteristics of Claim 3 make it possible to~~ Restricting the pivoting range of the toothbrush head in order to find can allow use of [[a]] realistic[[,]] and feasible spring element solutions that allows these pivoting ranges. Also, ~~when~~ When changing from the molars to the incisors, this pivoting range makes it possible to ~~also~~ realize a manual change in direction of the handle in order to achieve larger pivoting angles, namely similar to a toothbrush head that is rigidly fixed on a handle.

In some embodiments, the toothbrush head includes bristle clusters arranged such that the inside and outside surfaces of the teeth can be simultaneously brushed. ~~The characteristics of Claim 4~~ This orientation of bristle clusters can make it possible to directly clean both the biting surfaces of the molars

~~and as well as~~ the cutting surfaces of the incisors directly from above. Even if no bristle clusters extend into the receptacle space from the bottom thereof, the biting and cutting surfaces can also be treated by configuring the bristle clusters arranged in the lateral edge region near the bottom such that they protrude toward the center and therefore can treat the biting and cutting surfaces during the brushing process. ~~The characteristics of Claim 4~~ These embodiments also make it possible to allow optimal ~~optimally cleaning of~~ the chewing surfaces with a separate bristle section on the bottom of the toothbrush head.

In certain embodiments, a bristle section may protrude from the bottom of the receptacle space on the surface of the brushing side of the toothbrush head. ~~According to the characteristics of Claim 5, a superior brushing result of the chewing and cutting surfaces is achieved with~~ For example, a bristle cluster section may ~~that protrude~~ protrudes on the free front end of the toothbrush head at the height of the receptacle space. This bristle cluster section can help to provide a superior brushing result of the chewing and cutting surfaces of the teeth.

In some embodiments, a bristle cluster section may be approximately centered relative to the receptacle space and protrude from the free front end of the toothbrush head, and this bristle cluster section may further protrude over a bristle section situated on the bottom of the receptacle space. This configuration ~~The characteristics of Claim 6 cause~~ may allow the bristle clusters arranged in the edge regions to lie obliquely opposite—[[of]] one another and to enclose the receptacle space for accommodating the teeth. The more concave the surface, the more significant the

convergence of the bristle clusters on the edge regions and the more perpendicular their alignment relative to the lateral surfaces of the teeth. However, the alignment of the individual bristle clusters does not only depend on the alignment of the surface of the toothbrush head on the brushing side, but also the angle by which the individual bristle clusters protrude from the surface on the brushing side. ~~Due to the utilization of~~ Using both measures, the lateral surfaces of the toothbrush head do not have to be substantially angled relative to the bottom. Consequently, ~~such that~~ the installation of the bristle clusters ~~by means of using~~ a bristle fitting machine [[is]]can be significantly simplified.

In certain embodiments, [[If]]the receptacle space is open toward the handle (Claim 7), to simplify the placement of the toothbrush head around the teeth and the handling of the toothbrush are additionally simplified. For example, the surface on the brushing side of the toothbrush head may be essentially concave, with this surface extending transverse to the longitudinal direction of the handle and further including a front bristle cluster section arranged on an extension centrally aligned with and adjoining the front end of the toothbrush head. As another example, the receptacle space may be open toward the end of the handle that lies farther from the toothbrush head. In these embodiments, the ~~The~~ toothbrush head [[is]]may be slightly angled relative to the chewing surfaces of the teeth in this case because the bristle cluster section causes the distance between the toothbrush head and the chewing surfaces to be greater on the front end than on the open end of the receptacle space. ~~However, this is~~ This can help to actually desirable in order to ensure that the handle assumes a position in which it

protrudes from the mouth with a slight downward angle while the body is in an upright posture such that an improved hand position and therefore [[an]] improved handling [[are]] may be achieved.

In certain embodiments, ~~Due to the characteristics of Claim 8,~~ one end of the spring element is either stationarily mounted ~~fixed either~~ on the toothbrush head or on the handle ~~in an embodiment in which the~~ using a pivot bearing. ~~consists of~~ The pivot bearing includes a pin that engages a receptacle opening arranged on either the toothbrush head or the handle. ~~a pin bore arrangement.~~ The other end of the spring element contacts ~~the~~ a stopping elements that are ~~respectively arranged to adjoin both sides of the~~ spring element. ~~on the handle or on the toothbrush head and thusly forms the freely movable end of the spring element.~~ This end of the spring element is supported either on the toothbrush head or the handle by the stopping element. If the toothbrush head is pivoted pivots in one direction while brushing the teeth, ~~one~~ the stopping element contacts the free end of the spring element and bends the spring element such that a restoring force is generated. Once pressure is removed from the toothbrush head is lifted off the teeth, the spring element presses the stopping element to move the toothbrush head opposite to the actuated direction ~~by means of the stopping element and returns~~ returning the toothbrush [[hand]]head into its [[home]]unpivoted position. ~~At this point~~ When the toothbrush head is in its unpivoted position, the tension of the spring is zero. If the toothbrush head is pivoted in the other direction, the ~~other~~ stopping element presses the free end of the spring in the other direction and bends the spring such that a prestress is generated. Once released, the spring presses the stopping element to move the toothbrush head back into its

[[home]]unpivoted position. ~~by means of the stopping element.~~

Although the toothbrush head is subjected to a restraint during the brushing process due to the bristle clusters enclosing the row of teeth, it ~~always~~ ~~has the tendency to~~ pivots back into its unpivoted[[home]] position if the alignment of the row of teeth allows such pivoting ~~makes this possible.~~ If the toothbrush head is pivoted during the brushing process, ~~the a~~ restoring moment that constantly acts upon the toothbrush head. ~~in this case~~ Because of this restoring moment, ~~gives the bristles the have a~~ tendency to adjoin the teeth and therefore to clean and to massage the surface of the teeth ~~as well as the and~~ gums during the movement of the manual toothbrush.

~~These embodiments characteristics of Claim 9 make it possible to achieve a may allow~~ simpler mounting of the toothbrush head on the handle, ~~wherein~~ while also allowing the toothbrush head can still be to pivoted pivot back and forward relative to the longitudinal axis of the handle. ~~about the longitudinal axis thereof.~~

~~In this case some embodiments, the pin has such a length that it is long enough to penetrate penetrates into the a bore in the handle and a short section of the pin protrudes on the other end of the handle.~~ This short section is ~~then~~ widened by means of plastic deformation, namely e.g. under the influence of pressure or elevated temperatures, such that the free end thereby engagingengages the free end of the pin behind the bore from the outside similar to a rivet head. ~~However, it would also be conceivable to choose~~ In addition or in the alternative, other mounting



solutions may be used to attach the pin to the bore. ~~r~~  
~~for~~For example, ~~the attachment of a retaining ring on~~  
~~the rear end of the pin that also engages behind the~~  
~~bore may be attached on the rear of the pin.~~ It would  
~~even be possible to choose, for~~ As another example, a  
 snap-on connection may engage~~that engages~~ into a groove  
 arranged on the pin and thus ~~thusly~~ holds the  
 toothbrush head on the handle in a rotatable fashion ~~by~~  
~~means of using the pin.~~ However, it would also be  
~~conceivable, for~~ As still another example, ~~to screw a~~  
 screw that engages behind the bore may be screwed on  
 the free end of the pin from the rear side., ~~wherein~~  
~~this screw would also engage behind the bore in this~~  
~~case.~~

In some embodiments, the ~~The~~ spring element ~~can be~~  
~~designed in a particularly simple fashion if it~~  
~~consists of~~ includes a leaf spring or a rod spring  
 (Claim 10). [[A]]~~The~~ leaf spring ~~consists of~~ may  
include a strip ~~that is cut out of a thin sheet and~~  
 subsequently deformed into its final shape by means of  
 a bending tool. However, it could also be conceivable  
~~to realize the~~ Additionally or alternatively, the  
 spring may include ~~in the form of a rod with a round,~~  
 quadrangular, oval or any other cross section~~[[,]].~~  
~~wherein the~~ The material of the leaf spring or the rod  
spring may include ~~respectively consists of a spring~~  
 steel that is corrosion-resistant to water, saliva,  
 toothpaste, foods and other substances that are present  
 while brushing the teeth.

~~If the spring element is shaped in accordance with the~~  
~~characteristics of Claim 11,~~ Spring elements including  
a leaf spring or a rod spring can provide a  
particularly simple adjusting device ~~is formed that can~~

be easily mounted and generates sufficient restoring forces. ~~\_\_\_, wherein~~ With such spring elements, one limb may cause ~~causes~~ the restoring movement in one direction and the other limb may cause ~~causes~~ the restoring movement in the opposite direction.

In some embodiments, the spring element is arranged in a U-shape and formed by a crosspiece connecting two limbs to one another. A guide arbor engages between the limbs on the crosspiece, in that the pin penetrates the limbs at a distance from the guide arbor, and the stopping element engages the free ends of the limbs. For example, If the stopping element elements are realized ~~can be~~ in the form of a projection ~~projections as proposed in Claim 12, they can be~~ produced during the injection-molding ~~moulding~~ of the plastic toothbrush or the plastic toothbrush head. ~~This also applies to~~ The pin and the transverse web may also be produced during the injection-molding of the plastic toothbrush or the plastic toothbrush head.

~~According to a second~~ In some embodiments ~~with the characteristics of Claim 13, the leaf spring or rod spring essentially extends essentially linearly. \_\_\_,~~ ~~wherein~~ One end of the spring is fixed in the handle and the other end is fixed in the toothbrush head. In this embodiment, ~~The center of the spring element is either fixed in the toothbrush head or in the handle and the two opposite free ends form the elastic ends that contact the stopping elementelements. \_\_\_The stopping elementelements [[are]]is respectively arranged on the other component that does not carry the spring element. \_\_\_The stopping elementelements are realized~~ is arranged such that, when the toothbrush head is turned in one direction, one stopping surface of the stopping elementelement contacts the free end of

the spring element while the other stopping ~~surfaceelement~~ moves away from the other free end of the spring element. ~~wherein~~ The distant stopping surfaceelement contacts the spring element when the toothbrush head is turned in the other direction and the opposite stopping ~~surfaceelement~~ moves away from the spring element. ~~This~~ These embodiments ~~can also be realized in a particularly simple fashion may be provided without high assembly and manufacturing expenditures.~~

~~A third embodiment of the invention is defined with the characteristics of Claim 14. In some embodiments this~~ ease, one free end of a leaf spring or rod spring is fixed on the handle. ~~while~~ The other pivoted end is connected to an intermediate carrier that can be pivoted about the free end of the handle. If the intermediate carrier is realized in such a way that it can be clipped on the toothbrush head, the intermediate carrier pivots the toothbrush head is pivoted on the leaf spring or rod spring by means of the intermediate carrier. In order to prevent compressive forces from being transmitted to the spring element, the intermediate carrier or the toothbrush head is additionally supported on the surface of the handle.

In ~~a fourth~~ certain ~~embodiments~~ with the characteristics of Claim 15, the spring element includes ~~consists of~~ a coil spring. ~~the~~ The free ends of the coil spring of which are fixed in one of the two toothbrush components, i.e., either on the handle or on the toothbrush head. ~~while a~~ A stopping element connected to either the toothbrush head or the handle engages in the center of the coil spring, ~~and thusly~~ thereby prestressing ~~prestresses~~ one half of the spring element elastically in one direction while the other half is relieved. If the toothbrush head is

pivoted in the other direction, the exact opposite conditions occur. ~~These embodiments~~ is inventive arrangement makes it possible to achieve may allow particularly high forces to be exerted on the toothbrush head during ~~the pivoting process~~ because the spring functions as both a tension spring and as well as a pressure spring as the toothbrush head pivots during a pivoting process.

In ~~some a fifth~~ embodiments, ~~with the characteristics of Claim 16,~~ the spring element ~~includes~~ consists of an one or more elastomers that is made of plastic. ~~In this case,~~ The elastomers are also inserted into a recess that is either arranged either in the toothbrush head or in the handle. ~~and the p~~ Projections provided realized on the other component press against the elastomers when the toothbrush head is pivoted, ~~i.e., a restoring moment is generated~~ generating a restoring moment that acts upon and causes the toothbrush head to return into its unpivoted home position (Claim 17). For example, a recess may be arranged on the handle to engage with the pin and the stopping element, and one or more elastomers may be fixed in the recess to both sides of the stopping element.

The spring force can be varied ~~with~~ using an elastomer that has the same shape, but is made of a different material.

~~According to the characteristics of Claim 18,~~ Two elastomers that make it possible to realize may allow different spring characteristics ~~respectively to act~~ upon the toothbrush head in one pivoting direction.

~~A sixth~~ In some embodiments, ~~is defined with the characteristics of Claim 19.~~ In this case, the spring

element is an elastomer connecting the toothbrush head  
to the handle. For example, an elastomer [[is]] may be  
injection-molded~~moulded~~ between the toothbrush head and  
the handle in order to connect the two components to  
one another. The connecting length of the respective  
elastomer between the handle and the toothbrush head  
can be~~is~~ chosen so long that an to allow the elastomer  
to generate an acceptable restoring force. ~~is~~  
~~generated. In this embodiment, t~~The elastomer  
connection acts as a torsion rod. ~~, wherein t~~The  
bearing point is not in contact with the elastomer,  
thereby in order to directly transmitting the forces of  
~~pressure acting upon the toothbrush head during the~~  
~~brushing process directly to the handle. because this~~  
This direct transmission of forces allows a better  
adjustment of the brushing forces.

In some embodiments, The characteristics of Claim 20  
make it possible to achieve a simple elastic mounting  
of the toothbrush head on the handle, wherein webs or a  
sleeve-shaped section that respectively connect(s) the  
handle to the toothbrush head, allowing simple elastic  
mounting of the toothbrush head on the handle. The  
webs or sleeve-shaped section is/are injection-  
molded~~moulded~~ to the rear side of the toothbrush head  
as well as to the upper side and on the surface of the  
handle. A journal is supported on the surface of the  
handle and extends from the rear side of the toothbrush  
head into the spring element. Naturally, tThe webs or  
sleeve-shaped section can also be mounted to the  
toothbrush and the handle mounting can also be realized  
with a bonding process. The elastic mounting of the  
toothbrush head on the handle allows~~makes it possible~~  
~~for~~ the toothbrush head to adapt itself to the row of  
teeth during the brushing process because [[it]] the  
toothbrush head can be easily turned or pivoted

relative to the handle. The pivoting resistance of the toothbrush head relative to the handle can be varied by choosing the hardness of the respective elastomer accordingly.

In certain embodiments, a blind bore is arranged on the handle, and the journal engages into the blind bore.  
~~Due to the characteristics of Claim 21, t~~The pressing force exerted ~~upon~~ on the handle by the hand and transmitted from the handle to the tooth surface by the toothbrush head is directly supported on the handle. However, a pivoting movement is ~~can~~ still possible ~~be realized~~ because the pin ~~is guided~~ pivots in the blind bore ~~in a pivoted fashion~~ and elastically deforms the webs or the sleeve-shaped section made of elastomer. During the deformation, the elastomer is subjected to flexural, torsional, compressive and tensile stresses.

Other features and advantages of the invention will be apparent from the following detailed description, from the drawings, and from the claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

~~Several embodiments of the invention are illustrated in the figures and described in greater detail below. The figures show:~~

Figure 1~~[[,]]~~ is —a partial, perspective view  
~~representation of the an underside of a~~  
~~first embodiment of a toothbrush head.~~  
~~according to the invention, wherein the~~  
~~handle is merely illustrated partially and~~  
~~in a shaded fashion,~~

Figure 2~~[[,]]~~ is —an exploded perspective side view  
of the toothbrush head ~~according to of~~

Figure 1 and, ~~in the form of a perspective exploded view,~~ the upper side portion of a ~~an also partially illustrated handle,~~ wherein ~~the~~ with a spring ~~is realized~~ provided in the handle and ~~the a~~ stopping elements ~~are realized~~ provided on the toothbrush head. [[;]]

Figure 3 [[,]] is ~~—~~ a partial view of the underside of the toothbrush head according to Figure 1, ~~wherein with the spring is inserted,~~ however, on the underside of the toothbrush head and the stopping elements ~~are realized~~ provided in the handle. [[;]]

Figure 4 [[,]] is ~~—~~ a bottom view of the end of a toothbrush ~~according to a second embodiment on the side of the~~ including a toothbrush head. [[;]]

Figure 5 [[,]] is ~~—~~ an exploded perspective top view of ~~the a~~ toothbrush head and ~~the~~ handle, wherein ~~both components are illustrated in the form of an exploded view;~~

Figure 6 [[,]] is ~~—~~ a schematic representation of the underside of a manual toothbrush with, wherein ~~the spring element (illustrated in an exposed fashion) consists of a~~ an expanded coil spring, in the center of which and a stopping element arranged on the handle and engaging ~~engages~~ the center of the coil spring. [[;]]

Figure 7 [[,]] is ~~—~~ a longitudinal section through ~~the a handle of a fourth embodiment of a manual toothbrush in the region of the a~~ bearing,

~~wherein the~~ with spring elements ~~consist~~  
formed of elastomers.[[;]]

Figure 8[[,]] is ~~—a longitudinal section according to~~  
~~Figure 7 through a fifth embodiment handle,~~  
~~wherein~~ with four elastomer sections ~~are~~  
used as a spring elements, ~~and.~~

Figure 9[[,]] is ~~—a~~ longitudinal section that  
transversely extends through a ~~sixth~~  
~~embodiment of a manual toothbrush, wherein~~  
~~the~~ with a toothbrush head that is connected  
to the handle by ~~means of a an~~ elastomeric  
torsion rod. ~~in the form of an elastomer.~~

#### DETAILED DESCRIPTION

In Figures 1-9, ~~the a~~ manual toothbrush 1 ~~consists~~  
~~of~~ includes a handle 2 that is only ~~illustrated~~  
partially illustrated in the figures and a toothbrush  
head 3 that is mounted on a bearing head 43 on ~~the a~~  
front end 5 of ~~the an~~ upper side 4 of the handle 2. The  
toothbrush head 3 features a surface 6 on the brushing  
side, from which bristle sections 12, 13, 14, 15  
(Figures 2 and 5) protrude. The bristle sections 12,  
13, 14, 15 that consist of include several bristle  
clusters 8 and collectively form ~~the a~~ bristleing  
arrangement 7. The surface 6 on the brushing side is  
~~preferably realized provided~~ in a concave or shell-like  
bent fashion such that ~~the~~ outer edge regions 10, 11  
~~referred face one another about to the a~~ longitudinal  
axis 9 in Figures 2 and 5 ~~face one another.~~ , i.e.,  
~~the~~ The outer edge regions can, for example, extend  
upward from the upper side 4 of the handle 2.

~~In a top view of the rear side 21 of the toothbrush~~  
~~head 3, said toothbrush head extends, according~~



Referring to Figure 4, the toothbrush head 3 extends essentially transverse to the handle 2 and features an extension 17 on its front (in Figure 4 upper) region.  
~~, namely such that the toothbrush head 3 essentially has, if viewed from the rear side 21, toothbrush head 3, in this embodiment, has an outer contour similar to that of a "manta ray."~~

According to the embodiment in Figures 2 and 5, the bristling 7 is essentially divided into four bristle sections 12, 13, 14, 15, the rows of the bristle sections 12, 13, 14, 15 which essentially extend in the direction of the longitudinal axis 9. In this embodiment, the~~The~~ bristle section 14 that, if viewed from the top, essentially describes a rectangle is substantially rectangular and extends centrally in the bottom.~~, wherein t~~The cross sections of the individual bristle clusters 16 form elongated ovals that extend transverse to the longitudinal axis 9 in this case~~embodiment.~~ The bristle sections 12 and 13 are situated laterally adjacent to the central bristle section 14 and essentially protrude essentially perpendicularly from the obliquely elevated surface 6 on the brushing side.~~, wherein t~~The individual bristle clusters 8 of these the bristle sections 12 and 13 preferably may have a round cross section of identical diameter in this case. The bristle sections 12 and 13 include are respectively composed of three rows of the bristle clusters 18, the outer edge row of which essentially follows the contour of the edge of the toothbrush head 3, and therefore forms forming an outwardly curved outer row.

The bristle clusters 18 preferably may extend perpendicular to the surface 6 on the brushing side such that [[they]]the bristle clusters 18 converge due to the curved elevated surface 6. [[,]] however, The

bristle clusters 18 may converge only to such a degree  
~~that to create a receptacle space 19 is created between~~  
~~their the ends of the bristle clusters 18.~~ The  
receptacle space 19 that has may have such dimensions  
 that the bristle ends of bristle clusters 18 are able  
 to treat the chewing and cutting surfaces as well as  
 the inside and the outside surfaces of the lateral  
~~tooth surfaces~~ equally well. Depending on the  
 inclination on the edges of the surface 6 on the  
 brushing side, ~~these the~~ bristle clusters 18 may,  
~~however,~~ also protrude from the surface in an inclined  
 fashion.

The upper side of the outwardly open receptacle space  
 19 [[is]]may be limited by the bristle section 15,  
~~which that includes is composed of the~~ bristle clusters  
 20. Bristle clusters 20 with an are essentially  
 quadrangular or trapezoidal in cross section and that  
 are slightly inclined toward ~~the a~~ front point 38 of  
toothbrush head 3. ~~such that t~~The free ends of the  
 front bristle clusters 20 ~~according to Figure 4~~  
 protrude upward beyond the contour of the toothbrush  
 head 3 ~~(Figure 4)~~. The bristle section 15 can act acts  
 like a closed, thick bristle cluster that reaches the  
 rearmost molars particularly well during the brushing  
 process due to its inclination. In addition, the  
 individual cross sections of the front bristle clusters  
 20 and therefore also ~~the their~~ overall cross section  
 that forms the bristle section 15 are larger per  
 surface unit ~~referred~~ compared to the entire brushing  
 surface 6. Accordingly, ~~such that they the front~~  
bristle clusters 20 are able to can generate a higher  
 resistance to the tooth surfaces during the brushing of  
 the rear molar regions and the rear molars are cleaned  
 particularly well.

The rear of the receptacle space 19, ~~according to as~~ shown in Figures 2 and 5, is open toward the handle 2 such that ~~the teeth are able to~~ more easily engage into the receptacle space 19 from ~~this~~ the rear side without encountering ~~a~~ significant resistance and the toothbrush head 3 is better guided by the teeth. In this case, the toothbrush 1 is held at the handle 2 such that it protrudes from the mouth at a slight downward angle.

~~According to~~ Referring to Figures 1-3 and 7-9, ~~the rear side 21 of the toothbrush head 3 that faces away from the surface 6 on the brushing side~~ is provided with a bearing arrangement 22 that cooperates with the toothbrush head 3 and the handle 2. ~~According to~~ As shown in Figures 1-3, [[the]] a bearing arrangement 22 ~~includes consists, among other things, of~~ a pin 23 that protrudes ~~about~~ approximately centrally from the toothbrush head 3 on the rear side 21.

Referring to Figures 1-2, [[A]] a plane 41 around the pin 23 is recessed relative to an ~~the~~ outer surface 40 of the rear side 21 and, in the assembled state of the handle 2 and the toothbrush head 3, may serve ~~serves~~ as a limiting surface for partially accommodating ~~the~~ a spring element 26. On the other side, the spring element 26 realized is oriented on the face in of a depression 75 on the bearing head 43. Spring element 26 may be ~~is~~ limited by the ~~surface~~ bearing head 43. A stopping element 27 protrudes outward from the ~~recessed planer~~ rear side 21 on the toothbrush head 3 underneath the pin 23. wherein said ~~sThe~~ stopping element 27 features lateral stopping surfaces 28, 29 that engage between ~~the~~ limbs 32, 33 of the spring element 26 in the assembled state.

~~In Referring to Figure 2, a bore 30 is arranged on~~  
~~extends through the bearing head 43 of the handle 2 in~~  
~~order to receive the pin 23 in a precisely fitted~~  
~~fashion. The center of the pin 23 forms the a pivoting~~  
~~axis 36, about which the pin 23 can be pivoted in the~~  
~~bore 30. of the bearing arrangement 22. In the~~  
~~embodiments shown Figures 1-9, the angle between the~~  
~~longitudinal axis 9 of the handle 2 and the pivoting~~  
~~axis 36 is approximately 90 degrees. In [[an]] other~~  
~~embodiments variation, this angle may also be larger or~~  
~~smaller than 90 degrees. A guide arbor 25 protrudes~~  
~~centrally referred centered relative to the longitudinal~~  
~~axis 9 above the bore 30, and, wherein a the spring~~  
~~element 26 in the form of a U-shaped leg spring 26~~  
~~extends around this the guide arbor 25. In the~~  
~~assembled state of the manual toothbrush 1, the free~~  
~~ends of the limbs 32, 33 adjoin the stopping surfaces~~  
~~28, 29 of the stopping element 27. from outside. In~~  
~~this embodiment, Thethe stopping element 27 engages~~  
~~into a corresponding depression 44 on the bearing head~~  
~~43. in this case. However, tThe lateral dimensions of~~  
~~the depression 44 can be large enough to allow need to~~  
~~be so large that the stopping element 27 has sufficient~~  
~~lateral clearance when the toothbrush head 3 is pivoted~~  
~~about the longitudinal axis 9 within the a permitted~~  
~~angular range.~~

~~The equivalent embodiment according to In some~~  
~~embodiments, as shown in Figure 3, merely can be~~  
~~distinguished from the embodiment according Figure 2 in~~  
~~that the spring element 26 (e.g., leg spring) in the~~  
~~form of a leg spring is not is positioned on the~~  
~~bearing head 43 of the handle 2, but rather around the~~  
~~a guide arbor 34 [[43]], which that protrudes from the~~  
~~rear side 21 of toothbrush head 3. in this case~~  
~~rather than from the handle 2. The limbs 32, 33 of the~~  
~~spring element 26 adjoin the pin 23. According to~~

~~Figure 1, t~~The stopping element 27 (illustrated with broken lines in Figure 3) ~~with its stopping surfaces 28, 29~~ is provided~~realized~~ on the handle 2. The depression 44 for accommodating the stopping element 27 and the spring element 26 is ~~realized~~ provided on the toothbrush head 3 and extends around the pin 23 on the rear side 21.

Referring again to Figure 2, ~~In order to~~ mount the toothbrush head 3 on the handle 2, the spring element 26 ~~according to Figure 2~~ is initially placed on the guide arbor 25 ~~on the bearing head 43 in such a way~~ that the ~~two~~ limbs 32, 33 extend along~~en~~ the edge of the bore 30. The pin 23 is ~~then~~now inserted into the bore 30 and the toothbrush head 3 is displaced toward the handle 2 until the stopping element 27 engages between the ~~two~~ limbs 32, 33 and ~~their~~ ends the limbs adjoin the stopping surfaces 28, 29 of the stopping element 27. ~~Although this is not illustrated in the figures, t~~The free end of the pin 23 that protrudes beyond the bore 30 ~~on to~~ the underside 35 of handle 2 ~~is now~~ may then be subjected to a plastic deformation from the rear such that the free end of the pin is widened and extended~~extends~~ beyond the edge of the bore 30 in a rivet-like fashion.

~~Instead of thermally fixing the pin 23 on the rear side of the bearing head 43 in a rivet-like fashion~~In another embodiment, it would naturally also be possible to arrange a groove on the free end of the pin 23 and to insert a retaining ring may be inserted into a this groove on the free end of pin 23 after attaching the toothbrush head 3 to the bearing head 43. ~~wherein said~~The retaining ring can be~~is~~ supported on the rear side 21 of the toothbrush head 3 and thus~~thusly~~ holds the toothbrush head 3 on the handle 2 in a pivoted fashion. Alternatively, a (not shown) transverse bore

~~could be produced in the~~ pin 23 may include a transverse bore for accommodating a cotter pin. ~~Naturally, it would also be conceivable to use It~~ should be appreciated that screw connections or other conventional mounting means may alternatively or additionally be used to mount the toothbrush head 3 on the handle 2. ~~used in mechanical engineering. It goes without saying that the~~ In certain embodiments, mounting parts to be used are ~~preferably also made of~~ plastic.

~~When brushing the teeth~~ In use, the toothbrush head 3 ~~can be is placed on the teeth in such a way that~~ a row of teeth longitudinally engages into the receptacle space 19. For example, if ~~if~~ the toothbrush head 3 is placed, ~~for example,~~ on the front incisors, the handle 2 is ~~essentially held in the~~ approximate direction of the front row of teeth, i.e., such that the handle tangentially extends away from the tooth surface. ~~In this case, the~~ The handle 2 is ~~can be held~~ such that it is slightly inclined downward relative ~~referred~~ to the cutting surfaces of the teeth and the teeth completely fill out the open region of the receptacle space 19. When handle 2 is held in this orientation, ~~The other end, i.e., the~~ bristle section 15 ~~[[,]] more or less lies~~ approximately on and laterally adjoins the cutting surfaces of the teeth.

When transferring the toothbrush head 3 from the incisors to the molars, the toothbrush head 3 ~~is~~ can ~~pivot~~ ~~pivoted~~ about the pin 23 on the bearing head 43 if the handle 2 is not readjusted. ~~In this case, a~~ A stopping surface 28 or 29 elastically presses [[a]] either limb 32 or 33 of the spring element 26 outward. The other limb 33 or 32 is supported on the pin 23 ~~in~~ such ~~a way~~ that the region of the spring element 26 extending around the guide arbor 25 is bent under the

influence of the applied force. This force is continuously exerted upon the lateral tooth surfaces, namely on the inside ~~as well as and~~ the outside surfaces, ~~and thusly thereby improving~~ improves the brushing result. The transverse forces exerted upon the lateral walls of the teeth ~~only~~ diminish below a noteworthy value if the longitudinal axis 9 of the handle 2 extends symmetric to the longitudinal axis of the toothbrush head 3 and the handle 2 extends in the longitudinal direction of a row of teeth. However, ~~since~~ because the alignment of the teeth rarely corresponds to the movements of the handle 2, the elastic pivoting of the toothbrush head 3 causes the toothbrush head to adapt to the respective row of teeth.

The spring element 26 ~~according to the invention makes it possible to~~ can exert a clockwise as well as a counterclockwise torque upon the toothbrush head 3. The manual toothbrush 1 with U-shaped ~~bristling~~ bristle arrangement 7 can help to provide ~~can be guided particularly well during the brushing process due to the limited decoupling of the toothbrush head 3 from the handle 2, resulting in improved guiding during the brushing process.~~

Referring to Figures 4 and 5 ~~show a third embodiment of the invention. Instead of the U-shaped spring element 26 used in Figures 1-3,~~ the spring element 26 consists of ~~is~~ a leaf spring. ~~that preferably~~ The spring element (e.g., leaf spring) 26 extends linearly and is pressed into slots 24 in the handle 2 and in an intermediate carrier 50. In this embodiment, ~~[[the]]~~ a circular outer surface 45 forms the pivoting surface, and ~~wherein~~ the pivoting axis of the intermediate carrier 50 remains approximately centered ~~is still arranged about centrally on the bearing head 43.~~

~~[[Its]]~~—As shown in Figures 4 and 5, a bearing surface 46 ~~that is also may be provided~~realized in the shape of a graduated circle and adjoins~~adjoins~~ the outer surface 45. in this case. Referring to Figure 5, ~~the~~The spring element 26 protrudes ~~to such a degree on~~the ~~from a face 47 such that the upper end of the~~from a face 47 such that the upper end of the spring element 26 ~~is able to~~can pivot back and forward laterally in a frictionless fashion. ~~on its upper end~~in Figure 5. For this purposeIn this embodiment, the spring element 26 is embedded in a depression 48 that is opened toward the top by means of a slot 49, ~~thereby.~~The slot 49 serves for enabling the spring 26 to ~~freely move~~freely in the ~~back and forward~~lateral ~~laterally~~directions when the bearing head 43 is pivoted.

Referring to Figures 4 and 5, ~~also shows that the~~intermediate carrier 50 is connected to the toothbrush head 3 by rigidly inserting ~~[[the]]~~an outer edge 51 of the intermediate carrier 50 into a corresponding recess 52 arranged on the rear side 21 of the toothbrush head 3. ~~(Figure 4).~~It should be appreciated that intermediate carrier 50 can be connected to toothbrush head 3 using other techniques, such as ~~The mounting could be realized, for example, by means of clipping, pressing, or bonding.~~or the like. In some embodiments, ~~The connection may also be realized such that it~~the intermediate carrier 50 can be manually disengaged at any time in order to be exchange and be a replaceable component. ~~[[, f]]~~For example, the intermediate carrier 50 may be disengaged from the toothbrush head 3 and replaced when the bristle clusters 16 of the bristle sections 12-15 are become worn out. ~~In order~~As shown in the embodiments in Figures 2 and 5, ~~to maintain the structural height of the toothbrush 1 as low as possible,~~a step 53 is ~~can be~~arranged on the upper side 4 of the handle 2



(Figures 2 and 5) to maintain the structural height of toothbrush 1 as low as possible.

Referring to Figure 6, shows a schematic representation of a fourth embodiment of the toothbrush head 3 and the handle 2, wherein the toothbrush head 3 is also mounted on the handle 2 in a rotatable fashion by means of a pin 23. In this embodiment, the [[A]] spring element 26 in the form of is a coil spring. The spring element (e.g., coil spring) 26 is inserted into a receptacle space 54 arranged on the handle 2, wherein a stopping element 27 engages into the region of a central winding of the coil spring. spring element. If the toothbrush head 3 is pivoted to the left or the right about the pin 23, the corresponding outer stopping surface 28 or 29 respectively engages on a spring winding 55 such that the a corresponding section of the spring 26 is prestressed while the other section is relieved. The spring element 26 is laterally supported on the stopping surfaces 71, 72 in the receptacle space 54. Due to tThe prestress of one half of the spring element 26 [[,]] pivots the toothbrush head 3 is pivoted back into its homeunpivoted position shown in Figure 6 after it is released. In this caseembodiment, the spring element 26 may also consist of include a wire spring that is coiled or injection-mouldedmolded of plastic.

[[In]]Referring to Figure 7, the toothbrush head 3 is mounted on the bearing head 43 in accordance with the description of Figures 1-3, i.e., this aspect is not described in greater detail at this point. In contrast to the spring arrangement according to Figures 1-3, the spring element 26 consists ofincludes two trapezoidal elastomer pieces 55, 56 that are inserted into a recess 57 on the bearing head 43. in this case. The stopping element 27 that is integrally mouldedmolded on the bearing head 43 and engages between the two elastomer

pieces 55, 56 ~~[[,]]~~ such that ~~wherein~~ the stopping surfaces 28, 29 of ~~said the~~ stopping element adjoin the lateral surfaces of the elastomer pieces 55, 56. The stopping element 27 engages into a bulge 58 that widens downward according to Figure 7 and is laterally limited by the boundary surfaces 59, 60. In use, ~~When~~ when the toothbrush head 3 is pivoted, ~~these the~~ boundary surfaces 59, 60 serve as stops relative to the stopping element 27, thereby so as to limiting the pivoting range in one as well as the other both directions. The elastomer pieces 55, 56 are supported on boundary surfaces 73, 74 in the bulge 57, with one end and the other respective ends of the elastomer pieces are supported on the stopping element 27 with the other end.

Referring to Figure 8, The fifth embodiment of the manual toothbrush 1 shown in Figure 8 merely can be distinguished from the embodiment according to Figure 7 in that four elastomer pieces 61-64 are guided in a recess 65. rather than two elastomer pieces, wherein ~~these~~ These four elastomer pieces are spaced apart in the longitudinal direction by two diametrical stopping elements 27 on the pin 23. In this case, ~~t~~The free ends of ~~the~~ stopping elements 27 also engage into bulges 58 that feature the lateral boundary surfaces 59, 60 for limiting the pivoting angle of ~~the~~ toothbrush head 3 similar to the device in ~~analogous to~~ Figure 7. In the horizontal direction, ~~the~~ elastomer pieces 61-64 are limited by projections 66, 67 that are integrally ~~moulded~~ molded on the bearing head 43 and extend into ~~the close vicinity of~~ proximity with the pin 23.

If the toothbrush head 3 ~~according to Figure 8~~ is turned, ~~for example,~~ in the clockwise direction, the upper right and ~~the lower left~~ elastomers 64 and 62 are

prestressed while the two other elastomers 63 and 61 lie free. If the toothbrush head 3 is turned in the counterclockwise direction, the exact opposite conditions occur and the elastomers 63, 61 are prestressed while the elastomers 64, 62 are relieved.

Referring to Figure 9, ~~In the sixth embodiment according to Figure 9,~~ a journal 68 extending from the rear side 21 of the toothbrush head 3 engages into a blind bore 69 arranged on the bearing head 43 of the handle 2 and adjoins the bottom thereof. On the rear side 21 of the toothbrush head 3 as well as on the upper side 4 of the bearing head 43, a sleeve-shaped elastomer ring 70 is injection-molded~~molded~~ around the journal 68. The elastomer in order to serves~~as a spring element 26 for elastically returning the toothbrush head 3 into its unpivoted~~~~[[home]] position after it is turned and after it is axially pivoted, respectively. During the brushing process, t~~The toothbrush head 3 is supported on the bottom of the blind bore 69 by the journal 68.

Instead of using an elastomer sleeve 70, it would also be possible~~conceivable~~ to injection-mold~~mold~~ individual (not-shown) interconnected webs on the surface 4 of the handle 2 as well as and on the rear side 21 of the toothbrush head 3. The individual interconnected webs can be injection-molded using [[A]] thermoplastic elastomer (TPE).~~proved particularly practical as the injection-moulding material. The handle 2 and the toothbrush head 3 preferably consist of~~can be made of polypropylene. These same materials can also be used in embodiments similar to the embodiments shown in Figures 6 and 8.~~be used for the fourth and the fifth embodiment.~~

ABSTRACT~~Manual toothbrush~~

~~The invention pertains to a~~A manual toothbrush (1) with a handle (2) and a toothbrush head (3) that is mounted on the front end (5) of the handle (2). Bristle clusters (8) respectively extend from the lateral edge regions of the surface (6) on the brushing side of the toothbrush head (3), wherein the free ends of said bristle clusters only converge to such a degree that they form a receptacle space (19) for the teeth and clean the inside as well as the outside of one or more teeth during the brushing process. A pivot bearing (22) for pivoting the toothbrush head (3) relative to the handle (2) during the brushing process is arranged between the toothbrush head (3) and the handle (2), wherein the pivoting axis (36) of said pivot bearing extends transverse to the handle (2). According to the invention, the bearing (22) is also provided with a spring element (26) that is arranged between the toothbrush head (3) and the handle (2) such that the spring element (26) is elastically prestressed when the toothbrush head (3) is pivoted during the brushing process and it moves the toothbrush head (3) back into its home position after the brushing process. Due to the inventive design, the pivoted toothbrush head always returns into its home position such that a user is always able to easily place the brush head enclosing the teeth on the teeth.

~~(Fig. 2)~~

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